Wyld, J.
Notes on the gold districts of California, New Holland, Russia and America.

NOTES ON THE GOLD DISTRICTS OF CALIFORNIA, NEW HOLLAND, RUSSIA, AND AMERICA.

with four maps:

1. The world, shewing the gold districts.
2. The gold districts of Australia.
3. The gold district from Bathurst to Sidney.
4. The gold districts of California.

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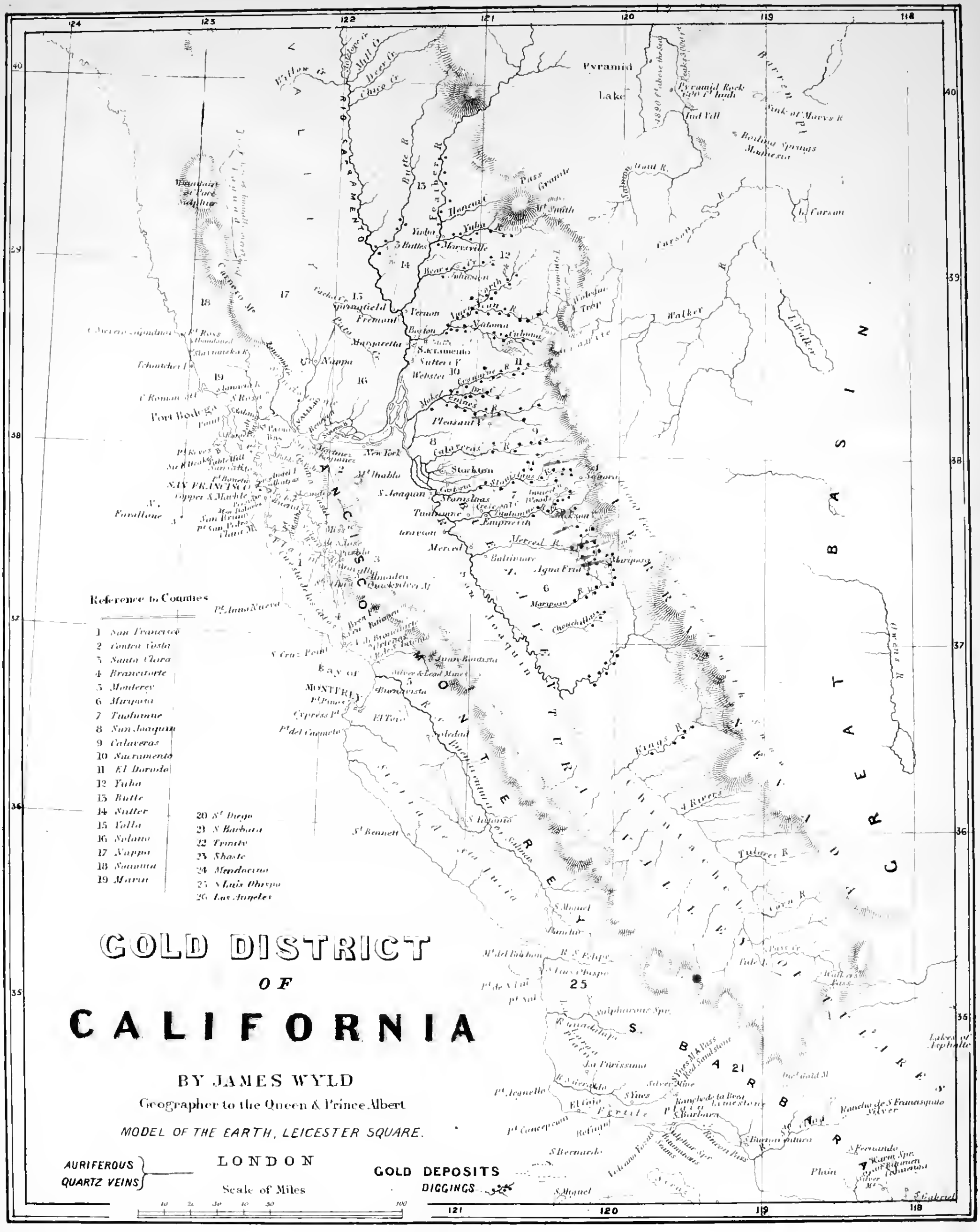
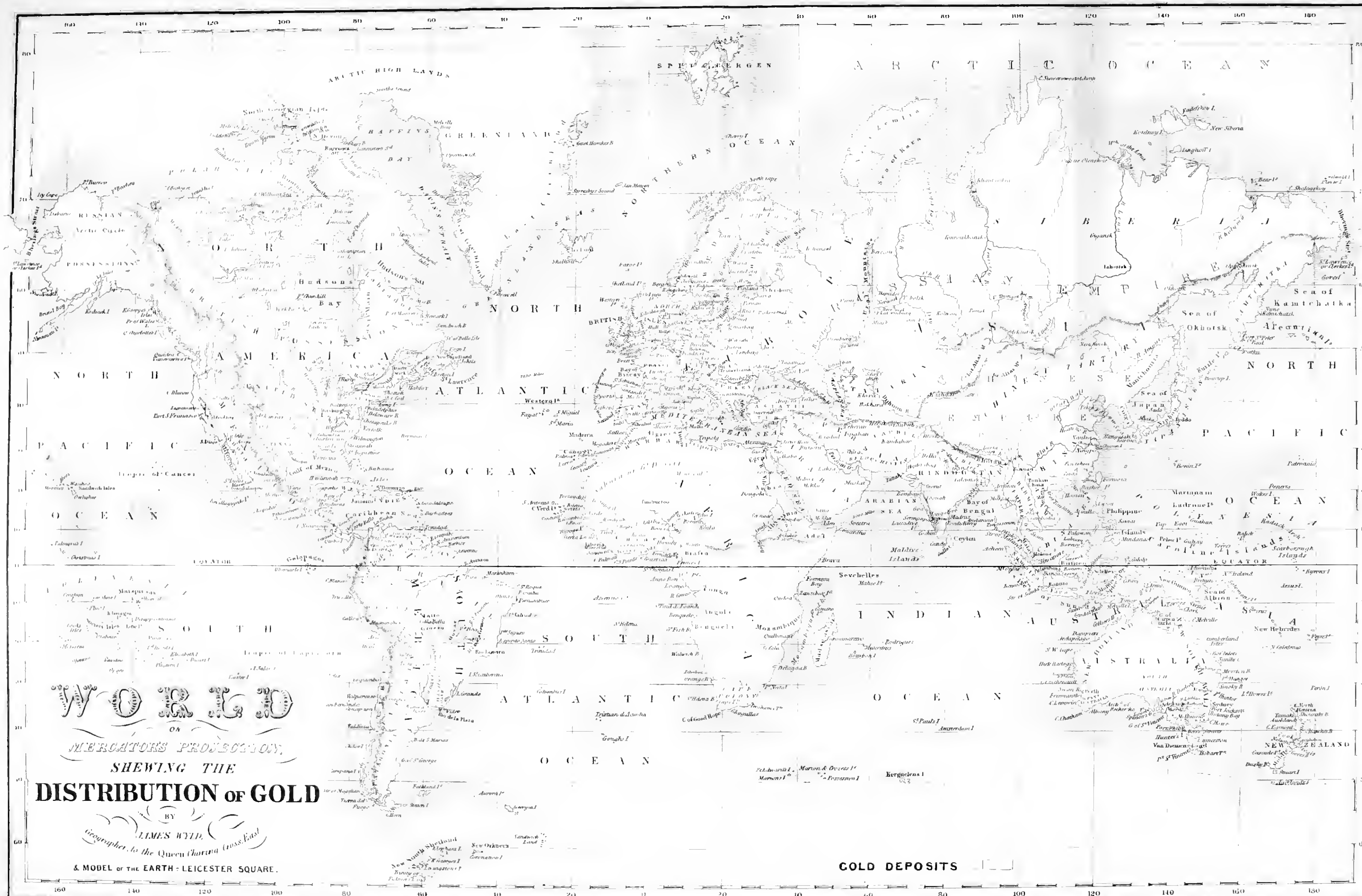
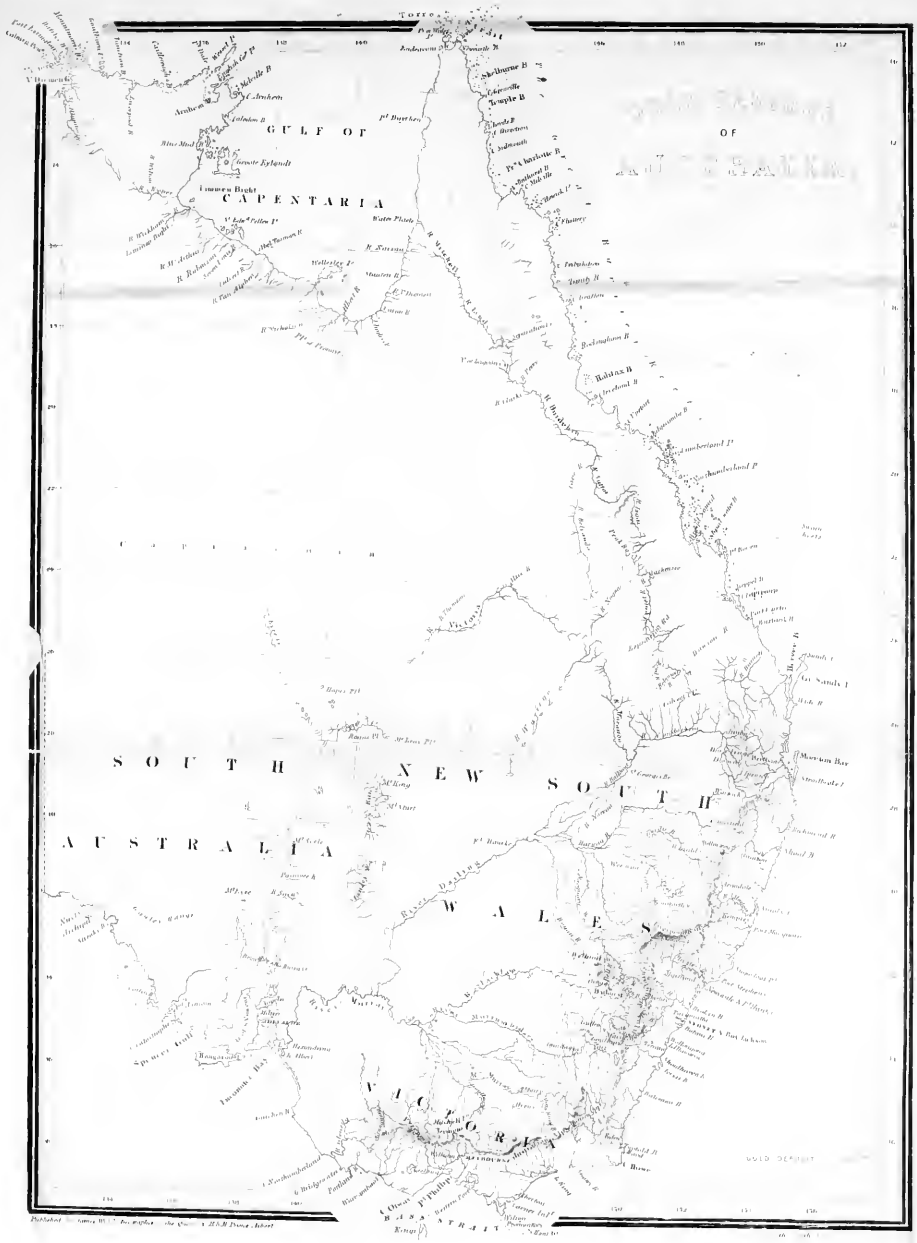


GOLD DISTRICT
OF
CALIFORNIA
BY JAMES WYLD
Geographer to the Queen & Prince Albert
MODEL OF THE EARTH, LEICESTER SQUARE.
LONDON
Reference to Counties
1 San Francisco
2 Contra Costa
3 Santa Clara
4 Branciforte
5 Monterey
6 Mariposa
7 Tuolumne
8 San Joaquin
9 Calaveras
10 Sacramento
11 El Dorado
12 Yuba
13 Butte
14 Sutter
15 Yolla
16 Solano
17 Nappa
18 Sonoma
19 Marin
20 St. Diego
21 S. Barbara
22 Trinite
23 Shaste
24 Mendocino
25 S. Luis Obispo
26 Los Angeles
AURIFEROUS QUARTZ VEINS
GOLD DEPOSITS
DIGGINGS
Scale of Miles
GREAT BASIN
SIERRA NEVADA
Pyramid Lake
Stockton
Sacramento
Port Bodega
Bay of Monterey


WORLD
ON
MERCATOR'S PROJECTION,
SHEWING THE
DISTRIBUTION OF GOLD
BY
JAMES WYLD,
Geographer to the Queen Charing Cross East
& MODEL OF THE EARTH · LEICESTER SQUARE.
GOLD DEPOSITS
ARCTIC OCEAN
NORTH ATLANTIC OCEAN
SOUTH ATLANTIC OCEAN
INDIAN OCEAN
NORTH PACIFIC OCEAN
SOUTH PACIFIC OCEAN
EQUATOR
NEW ZEALAND


GULF OF
CAPENTARIA
SOUTH
AUSTRALIA
NEW
SOUTH
WALES
VICTORIA
BASS
STRAIT


MAP OF THE
GOLD REGIONS
OF
AUSTRALIA
by James Wyld
GEOGRAPHER TO THE QUEEN & H.R.H. PRINCE ALBERT

NOTES ON THE GOLD DISTRICTS

OF

CALIFORNIA,

NEW HOLLAND, RUSSIA, VIRGINIA,

AND AMERICA.

§ 1. INTRODUCTION ON THE GOLD QUESTION.

From the time when men bartered with each other, a measure of value was set up, and is to be found in most commonwealths or tribes, however rude. Whether this measure have relation to a hundred oxen, a hundred slaves, a hundred beaver skins, or a hundred cowries, the principle is alike admitted. Whenever a state of advancement is reached, and the metals are brought into use, we find the recognition of a metallic currency, either of iron, or brass, gold or silver, marked out by its intrinsic value and its great specific gravity. As the production of other metals increased, gold and silver became distinguished by their rarity, and acquiring a higher relative value, became particularly fitted to serve the purpose of a measure of value. Oxen had to be fed; death made monthly inroads among them, and they could not be readily transported to a distance, whereas gold and silver kept their value, entailed no trouble for maintenance, and could be carried from hand to hand. Thus a hundred pieces of metal represented a payment with much more convenience than a hundred head of oxen. The legends of individual nations have assigned personages to whom the finding-out of money has been given; but in this, as in other things, it is much

more likely that each distinct race of men, kept apart from each other by distance, made its own separate discovery, as, according to its own local circumstances, it gave denomination to its measure of currency, or assigned its peculiar representative.

The use of metals, and of the precious metals in a rude form, as currency, must, in most cases, have preceded the use of coined or stamped money. It is true a piece of metal might be stamped with an ox, or some other emblem, and the art of coining might date from as high a period as the other formative arts; but there is much greater likelihood that it was of the same time with the introduction of writing among the several races, and which would be much later than learning the use of metals. Thus it was only at a comparatively late date that the Syrian and Western Indo-European tribes derived an alphabetic character from Egypt, and it is only within that period we find coined money coming into use; and the like may be augured of the Chinese and others, having a career of civilisation independent of the Western world.

In the present state of palæethnology, we are obliged, from the imperfection of our materials, to contemplate the history of the world as simply affecting the Western nations, though events of the same nature and importance as those which we regard must have operated on the great empires of the East. It is from this narrow point of view that we must regard the particular history of these metals, as affecting the Western nations, and Europe more especially. River washings there can be no doubt were the chief ancient sources of gold, silver and tin. Stream working could be rudely carried on in the bed of the Phasis, or in the rivers of Spain and Cornwall, as it is in this age in the streams and valleys of the Sacramento. These workings were, however, more difficult to carry on, as the metal washers, in a rude state, went through greater hardships, and could less readily get food than even the gold finders of California. The moment, too, that a gold-finding became productive, then, as the Indians have done in Sonora, in our days, wild tribes would pour down, strip the

miners, and drive them away, but never set to work in their stead: thus the sources of supply must have been precarious.

The Phænicians seem to have been the earliest in our western parts, who set themselves orderly to work to carry out the mining of the precious metals on a great scale. The Egyptians were contented with the supplies of gold which they obtained from the mines of Nubia, and by trading with the inland of Africa, for the gold dust found by the blacks, then, as now, in the streams. They likewise got by trade, gold, silver, and tin, from the east through the Red Sea; in this, too, the Phænicians competed with them: and it was perhaps to compete with them in the African gold trade that the Phænicians founded the settlement of Carthage, thereby getting supplies of gold dust by the caravans over the desert of Sahara. It was, however, to Spain that the Phænicians directed their chief efforts. The discovery of that great country, rich in the precious metals, gave them an independent source of supply. It may be, that the Phænicians, like the Etruscans, were members of the great Iberian, or Euskardian race, and that they were drawn to Spain by ruder members of their race, or to support some declining tribe, yielding before the wild forefathers of the Basques, or before a Celtic invasion. The towns the Phænicians established on the sea shores enabled them to protect their workings, and to throw in supplies, and not only in the streams where they washed for gold and tin, but in the mines rich in silver and lead, they kept thousands of slaves at work, under an armed force, thus giving the example of that system which the after inhabitants of the Peninsula applied in Peru and Brazil. It was only by such means, by the application of rough and unrewarded labour, and by the coercion and defence of an armed force, that large workings could be carried on. The best known ancient gold mines, besides those of Spain and Nubia, are those of Mount Pangæus in Thrace, of Thessaly, of Thasus or Scaptesyle, Siphnos, Cyprus, Sardinia, of the country of the Salassi, now Aosta, of the Alps from the streams of the River Po, of Aquileia, of Illyria, of Armenia, Astyra near Abydos, of the River Pactolus and Mount Tmolus near

Sardis, in Asia Minor. It was through the produce thus obtained, that the nations on both shores of the Mediterranean Archipelago obtained that large supply of the precious metals, which had so great an influence on their advancing civilisation. It is true that individual adventurers were ever ready to engage in enterprises which promised wealth, and although the voyage of the Argonauts engaged the best blood of Hellas, yet neither gold robbing nor gold working enriched the nations of the west. At a later historical period, military expeditions brought large supplies of the precious metals into Europe, but there is no marked epoch of prosperity which can be assigned to their influence.

In modern history the case has been different. It was of little comparative importance that Columbus discovered a new world, for Vasco de Gama had done that; but he succeeded in the great end of all such expeditions of discovery, the obtaining access to regions of gold and silver. The immense quantities of these metals poured in from America, affected not merely all the commercial transactions of Europe, but were felt by the farmer in distant states, and the shepherd on the hill side; while a vast population pouring over the western deep laid the foundation for new relations of commerce. This discovery of the western world is a marked epoch in the history of the world at a period when many great events were concurring to influence the destinies of the human race. The art of printing, the improvement of navigation, the discovery of gunpowder, gave a fresh impulse to the practical arts, while the restoration of ancient learning, the toppling of the Aristotelean philosophy, and a greater extension of religious liberty, opened to the mind for a time a more independent action. On the English race in particular, that epoch had a marked influence. In England and Scotland English principles began to regain their ascendancy, and the rights of freedom were restored, while our kindred in the Netherlands obtained as great a measure of emancipation: at the same time the Spanish and Gallic races were depressed by the causes which elevated us.

It is interesting to look back and to make out the development of events, but it is no less so to see them pass before our eyes—to be present and to take part in them, and we have now arrived at a period far more important than that which we have just contemplated. Circumstances external to those which we have for our special subject and consideration, have been no less influential than they in giving it this character. The establishment of the locomotive and the ocean steamer, the laying down of the telegraphic wire, the discovery of electro-metallurgy, and the application of the daguerrotype, create a new era in the practical arts; but never, perhaps, has the progress of science been more extraordinary. The advancement of the electro-magnetic sciences, of geology, of ethnology, and of the economical sciences, has done much to liberate mankind from dependence and dogmatism, and to direct them to original research, while there have been those events in politics, in religion, and in social economy, which show that some great action on the human mind is in progress. At this time, when in addition to the gold workings of Russia and Virginia, the discoveries in California and Australia have opened a new field for enterprise, which has set the nations of the world in movement, the position of the English race is still more striking than it was three centuries and a half ago. By two great empires it now keeps a great part of the world under its influence; on the shores of the Atlantic, of the Pacific, and of the Indian Ocean, our settlements are the means of awakening enterprise, and give us the opportunity of profiting by each new event; from the Icy Sea to the Gulf of Mexico, America belongs to our people; Australia we have encompassed, and marked out its destinies, and in the south of Asia hundreds of millions already own us as their masters.

Under these circumstances, it is not idle to speculate on what is going on around us, and in what way we are likely to be influenced. By events such as these, the destinies of men, of households, of whole nations, are affected. Until the expedition of Columbus, the lot of a Spaniard bound him to the Peninsula; but from that time, the farthest regions of the

earth became a beacon to the wanderer. The mother found her offspring listening to wonderful tales of new lands of gold, which were to draw one son to Mexico, another to Guiana, and another to Peru. Our people, born to enterprise, whom neither the shores of Jutland, nor of this island could keep in, spread themselves over the world; and California and Australia have given a new spur to emigration. The quick invention of the poet, and the ready belief of rude populations, never gave life to a tale so wonderful as that of the city of St. Francisco. A Hindoo or a Tartar emperor drew along with him the population of a metropolis in his camp, but San Francisco became a settled city in a few months, and by astonishing energy has maintained its existence against chance conflagrations and the ravages of the incendiary. A mighty commerce has been organised, traders and immigrants resort from all parts of the world, and a line of powerful steamers keeps up constant and regular communication, bringing it within the immediate influence of civilisation. What the destinies of Australia may be, none can tell; but the statesman, the merchant, the skilled mechanic, the under-fed husbandman, and the starving beggar, alike turn their eyes with eager glance on a scene teeming with brightest hopes: nor is there any one, who, in the progress of these great events, can feel assured that he will not be touched by their operation, in his household, his connexions, and his fortunes.

At the same time, though the action may be immense, individual expectations may be overtasked. It is now known that gold digging, however large, in its nominal returns, is not, as a pursuit, more productive of net profit than others. If, however, the labourer has to moderate his hopes, so has the merchant. The like observations, which we made in 1849 as to California, apply in 1851 to New Holland. The Geographical and Mineralogical Notes published in the former year to accompany the Map of the Gold Regions of California, contained such a sketch of the development of Californian prosperity, as experience has proved. It was then said, "Our

fathers* watched the progress of America—we ourselves have seen that of Australia, but the opening of the Pacific is one of the greatest events in social history, since, in the fifteenth century, the East Indies were made known to Europe; for we have not, as in America or Australia, to await the slow growth of infant settlements, but to witness at once the energetic action of countries already in a high state of advancement. The eastern and western shores of the great ocean will now be brought together, as those of the Atlantic are, and will minister to each other's wants. A happy coincidence of circumstances has prepared the way for these results; everything was ready; the word only was wanted to begin, and it has been given." How well this description has been justified by subsequent operations, all will bear witness.

We did not, however, stop with this general prediction, but went further to point out the details. "The outflowings of Chinese emigrants and produce, which have gone towards the west, will now move to the east. The commercial enterprise of Australia and New Zealand has acquired a new field of exercise and encouragement; the markets which Chile and Peru have found in Europe only, will be opened nearer to their doors; the north-west shore of America will obtain all the personal and material means of organization; the islands of the Pacific will take the place in the career of civilisation, for which the labours of the missionary have prepared them: and even Japan will not be able to withhold itself from the commonwealth of nations. All this is worth more to our merchants and manufacturers, and to the people employed by them, than even the gold mines can be, for this is the statement of certain results; and the workings of the gold mines, however productive they may prove, must be attended with all the incidents of irregularity and uncertainty, and great commercial disadvantages. The sketch given above, of the organization of the Pacific, shows how necessary it is to modify the views of those who think we either shall, or can

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* Geographical Notes to Mr. Wyld's Map of the Gold Regions, p. 2.

derive great immediate results from California. It is fortunate for us it is not so. We shall trade with California and the Oregon, it is true, but we shall do much more in the increased trade with Valparaiso, Callao, Matanzas, Honolulu, Shanghae, Hong Kong, Canton, Singapore, Sydney, Melbourne, Adelaide, Launceston, Hobart Town, Wellington, and Auckland. Already these markets feel the movement—new goods must be sent out, and in the improvement of these markets we shall have further guarantees of 'permanent prosperity."

That Chinese emigration has filled San Francisco with an industrious population; thousands have migrated from Sydney, Melbourne, Hobart Town, and Wellington; Chile has been enormously enriched by her exports of flour to California; Hawaii from merely exciting interest, as an example of Kanaka advancement, has become a state of importance; the New York and London shippers to San Francisco have been seriously disappointed; but an enormous and profitable trade has been carried on with the South Pacific.

The present position of Australia admits the application of the like observations. A civilised population is on the borders of the gold beds, trained miners are to be had from the copper shafts of Burra Burra and the coal-pits of Newcastle, while every facility is presented for throwing in a flood of immigrants. To California, the passage round Cape Horn was a long and dear one; to Australia it is shorter, and, being better organised, it is cheaper. The overland transit of the isthmuses to California was beset with difficulties; a steam line, however, already girds the Australian shore, and the great ocean ships now approach it at the Cape of Good Hope, Singapore, Panama, and Valparaiso. Thus a slight exertion of enterprise will place Sydney in union with London.

The political circumstances affecting the South Pacific are, perhaps, even more favorable than those connected with the North Pacific. California stood almost alone, with Oregon undeveloped, and Vancouver's Island only just occupied; but the Australian settlements form a chain of thriving provinces,

including Moreton Bay, New South Wales, Victoria, Tasmania, South Australia, and Western Australia. Close at hand is New Zealand, which, with Tasmania, will, in case of need, supply those provisions for the gold mines which San Francisco received from Valparaiso and Shanghae. Valparaiso, the great English emporium in the South Seas, and all the harbours of Chile and the South American coast, are more accessible to Australia than to California. The position of China as a source of immigration is more favorable for Sydney than its northern rival; and the events now taking place in China, where a new emperor besets the south, are likely to render even the wealthy classes of Qwang-tung and Fokien disposed to emigration. The coolies of Hindostan can, if there be need, be made as available for the English settlements in New Holland as for Mauritius or the West Indies; thus, there can be no fear of the want of working population for the mines; or of shepherds for the wool stations, and indeed, the finding of the gold works has already borne this good — that it has stopped the large immigration to California, which from Sydney alone was at the rate of 3,500 yearly, the passages from England of most of whom had been already paid from the land-fund of the colonies they abandoned. Immigration has indeed begun from San Francisco.

The wool and other business of New Holland may be deserted for a time; but there can be no lasting want of cheap and plentiful labour. A short spell at gold digging will sicken most men of the calling; and they must fall back on the staple trade of the settlement, or they must starve. There will, moreover, be the means of importing not only the Araforas and the Maoris for shepherds, but the Chinese and the Hindoos; and it may be found useful to remove to New South Wales some of the Cape Caffres.

The one fear for New Holland is from the convicts; but even the gold finding meets the convict question. No more convicts can now be sent to New Holland: not only is the voice of the settlers given against it, but neither convicts nor keepers can be trusted so near the gold lands. As for the emancipists and

ticket-of-leave men, to some the gold diggings will open a new path of life; but there is no ground for the same fear of them as in California. There they had no government to contend with, and the rowdies of the old world and the new, to shelter their misdeeds; but in New Holland it is otherwise: there is a strong community and a strong government; and the forms of the constitution and of law do not in this case give a shield to sham citizens. The murderer cannot be acquitted by a coroner and jury who turn round from the gambling table to make a sham investigation; nor can a mock corporation or legislature be set up at the will of outcasts, having nothing of citizenship but the name. Already it appears likely that the Governor-General will be able, by means of a system of legal licensing, on a moderate scale, to obtain funds for the maintenance of order, and to protect for the workman the fruits of his labour.

In considering the probable effect of the gold diggings on existing interests, many circumstances have to be taken into consideration, which will certainly benefit them in consequence of the gold diggings. Thus, already, the home government have been spurred up to push on the arrangements for ocean steam communication, and this question has been greatly advanced. The convict agitation may likewise be considered as virtually settled. The introduction of a greater population will give a value to stock and sheep for meat which they do not now possess, and which will go to meet enhanced charges. While the freight of treasure and the greater chance of passengers make ocean steam navigation more feasible, so likewise are greater facilities offered for home communication. The Sydney railway will now undoubtedly be pushed, and the more particularly as the land-sales and other revenues of the province are likely to be accelerated; and roads will be opened to the upland, which will give greater vent for the transport of wool and other produce to the shipping harbours on the shore. So, too, the steam navigation of the Murray, which has long been wished for, is likely to come into operation.

§ 2. GEOLOGY OF GOLD.

Gold is more abundantly found in quartoze, and slaty rocks of high antiquity, particularly in those called Silurian by Murchison, which lie in contact with granite, porphyry, and other eruptive rocks. It is not, however, in such solid rocks when in their original position, that the richest gold mines have prevailed, but only in their debris or gravel, as spread out on the flanks of the mountains. Emery and quicksilver are frequently found in gold countries.

It is considered by some, that gold is not to be found as an ore, chemically united with other elements, but always in a native or pure state, even if mechanically combined with platinum, silver, palladium or other allied metals. When in rock, it is therefore found in grains, thin leaves, knobs, or even great lumps, from a grain barely to be seen, to lumps which have been met with above one hundred pounds weight, and worth some 4,000 sovereigns. The gold may be either spread everywhere, and mixed up throughout the rock, or it may be in veins or lodes, spreading about like the twigs of a tree—here thickly, there scantily. As connected with the primary formations, gold veins are sometimes found *in situ;* but it is only in a few districts that they are worth working; for when followed as a mining operation, the yield of mineral is small, even if the worth is great. It is for this reason that the gold veins in the older rocks of our islands are not wrought, as a mass of mineral must be powdered up, more than the returns will pay. Thus, Merionethshire and Wicklowshire have yielded no permanent results. Indeed, although gold veins are worked in many places, it is chiefly in the Brazils, Siberia and California that gold has been found worth working on a large scale.

It is to the heaps of old detritus, resulting from the breaking down of mountain sides by former great convulsions, as well as to the banks of the rivers which *flow through such accumulations*, that we have to look for the most profitable supplies of gold. There, instead of hard rock, soft sand and gravel have to be searched, and the gold is often thrown together under natural arrangements; while there is a better pros-

pect of getting on a bunch or lump of rich ore. The gold-bearing rivers may be within the primary formations, or flow beyond them; but they derive their chief supplies from the heaps, and hills of old drift, orginally formed out of the older rocks. A grand error in all ages, and which has often diverted attention from stream washing, has been the constant endeavour to seek in the mountains for the "mother supply" of gold*. These researches have very seldom succeeded, because the object of search was beyond reach, the assumption of some large concentrated mine being false. On piercing the rocks, the superficial supply has generally been found scanty, and those who hence attempted deep workings, in the hope of reaching better veins, have been disappointed, because the gold seems to be chiefly distributed superficially.

A drift, resulting from the former abrasion of the surface of gold-bearing rocks, is a natural mining operation, which was carried out upon a large scale, thousands of years ago; and so far as the superficial supplies of gold are concerned, it is likely to be more productive than any immediate working in the rocks. A gold drift is, indeed, the result of a gigantic gold washing; and credulity might well dream it to be the labour of elfin workmen. By the action of ancient convulsions, and floods in the high mountain regions, the primary rocks were worn down, and the rubbings or detritus are now carried through the watercourses which drain the upper districts. The amount of this detritus is enormous; though the amount of gold found will not be in proportion to the local deposit of detritus, but to the whole amount of detritus which has been carried over the spot from the time the scouring of the mountain sides began. The whole amount of detritus will, it is true, be carried down the valley, and some part into the sea; but the gold, in virtue of its greater weight, will, in a river of any length, be deposited far above the sea estuary. Thus, the accumulations of gold in the whole water basin must relatively be large, as the result

* The Quartz veins in the Mariposa district of California are examples of superficial workings in the solid rock.

either of the former great drifts, or of a constant and long-continued action or washing of those aucient deposits.

In many cases, although the upper sand of the river bed may show no token of gold, yet it may be found plentifully below, where the coating of sand is thick, or the washing of the flood is deep. The deeper the gully the greater the chance of a deposit, and in such places the diving bell has been used with success.

The same cause which restricts the gold deposits to the water basin, further heaps it up on given spots. It may be there are several of these in the course of a river, and the deposits on each spot may be more or less thickly spread; but every natural bar which dams the waters, will likewise dam the gold; and it is at these places, and above them, the gold will be mostly found, though mountain freshes will sometimes sweep gold to a further barrier. In these natural divisions, the gold will be found heaped together against a ledge of rocks, or spread for miles along the banks, where the stream is sluggish. In some parts, the gold is to be met with resting on a bed of rock, in others mixed up with the gravel, at the lowest bound to which the action of the river flow or freshets reach. Local observation directs the miner to the most likely place for finding the gold; but wherever met with, it is in the same condition as if obtained from crushing the rock, namely—pure, and in dûst, scales or lumps.

A distinction may be drawn between ancient deposits and new deposits. In ancient deposits, the gold is often found in what are no longer the watercourses of the quartz or granite mountain chains. A distinction of this kind is perhaps the basis for the difference between what in California are called the dry diggings and the wet diggings; though the dry diggings have been considered by some as less productive. The dry diggings are in the old drift on the higher banks, the wet diggings in the beds of the rivers; but then it is to be observed in this case, what are called the wet diggings really include the old and new deposits together; and being on the site of the old watercourses, which pass through the

ancient heaps of gold drift, expose all the richest materials of the whole period of natural gold accumulation.

On the discovery of gold deposits in a given spot, it cannot be safely assumed that the whole water basin below will produce gold. Gold is found in the Goomty, at the foot of the Himalayas; but it is not therefore to be looked for in the Hooghly, a thousand miles below. In such a distance, the bulk of the gold will be deposited at each fall or natural weir, and but a small surplus can be available for a distance; besides, there is good reason for believing, that when once the low and flat lands are reached, a few miles of sluggish river will thoroughly sift from gold all the detritus brought down from above. For these reasons, the lower valleys of the Murray are only likely to have gold deposits in virtue of ancient geological operations, as it is little likely any gold can be carried from the junction of the Darling to Lake Alexandrina. Gold exists in the South Australian formations, near the mouth of the Murray, as it does in those of New South Wales, at its head; but any gold in the intermediate spaces, is more likely to be found in the side creeks and feeders, than in the main stream. The deposits do not, indeed, depend upon the rivers, but on the mountain chains which contain gold-bearing rocks.

§ 3. SYSTEM OF GOLD-WORKING.

For gold workings, there are three chief methods,—washing, crushing, and mining,—dependent on the locality in which the gold is found; washing being applied to sands, crushing or stamping, and mining, to rock formations.

Gold-washing or streaming is a rude operation, much the same everywhere, or rather, varying only according to the extent of labour and the degree of co-operation acquired. Thus, the black on the Niger, the Hindoo on the Goomty, and the Englishman on the Sacramento or Murray, works singly in the same manner, digging and turning over small portions of sand; but some of these latter, banding together, form companies, which obtain more powerful washing ma-

chines, or which, occupying a larger district, dam up or divert the mountain streams. Still, the operation of washing rests on the same basis. It must, too, be carried on upon the spot, because the yield of gold being small to the bulk of earth, the sand can never be carried profitably to a distance.

The gold being always found in a state nearly pure, and of high specific gravity, by its greater weight is readily separable from the earth or sand in which it is mixed, and on being well washed, even in the palm of the hand, will leave behind the metallic particles. The collecting of the sand, and the washing, therefore constitute the whole operation; and in the beginning of the new discoveries, we find men working with clasp knives and wash-basins, for want of better tools. In the more advanced stages of working in California, however, picks, and spades, and wheelbarrows are brought into play, by which labour is made more effective. It does sometimes happen that the digger is rewarded with a lump of gold which, being of ten, twenty, forty, or fifty pounds weight, may at once yield him five hundred, a thousand, or two thousand pounds; but most commonly the gold must be obtained by washing, being really in dust or scales.

In some of the rude districts of Hindostan, pans and winnowing baskets are still used for washing; but where parties are organized, even there a "cradle" or washing machine is then employed. One reason, perhaps, why the attention of the Americo-English was not more strongly called to gold-streaming is, because the gold-hunters of Virginia worked singly, and the yield was so inconsiderable as to leave little profit. So it is in those districts of India where the sands are poor, and the washing is carried on singly. The cradle, however, affords a great economy of labour; and thereby sands can be washed which would otherwise take an enormous period to sift. Some formations are, nevertheless, rich; and in the early period of the Californian workings, Mr. Sinclair, an old settler, set fifty Indians to work on the North Fork of the Sacramento, with native-made willow baskets, and yet he got about £600 or £700 weekly.

The cradle is very simply arranged. In its primitive form, as used by the Chinese in Borneo, the Hindoos in the Dekkan, or the English in California, it is a box on rockers, and six or eight feet long, open at the foot, and having at its head a coarse grate or sieve. In the early Californian cradles the bottom was rounded, and nailed across with small cleats. This kind of machine will employ four men—one digger or excavator, to raise the sand; another to carry it to the grate of the cradle; a third to rock or shake it violently; and a fourth to pour on water; but now the mechanical arrangements are still further improved. The use of the sieve is to keep the coarse stones from going into the cradle, while the current of water washes away the earthy matter, and the gravel is gradually swept out at the foot of the machine, leaving the gold mixed with a heavy, fine black sand, above the first cleats. The sand and gold mixed together are then taken away, and the sand being dried, is blown away, the gold remaining free behind. The gold thus obtained is, according to quantity, put in quills, bottles, or bags. Cradles of large size in California have peculiar names. A cradle 9 or 10 feet long is called a Long Tom, but some use the Virginia Burke Rocker, employing quicksilver to amalgamate the gold*.

It will be perceived that the cradle is only carrying out the process which nature has pointed out. As the gold thinly disseminated in the rocks is washed out of the rubbings of the primary formations, and carried down the rivers until it lodges against some bar or ledge, where its greater weight causes it to fall to the bottom of the sand or river bed, so is the gold sand passed through the cradle, and the gold is lodged against the cleat or bar of the cradle, the gold being always at the bottom of the stream, and only able to pass in suspension when mixed up with a quantity of lighter mineral. Washing tables are used in Siberia; but gold machinery does not admit of much complication. The use of the diving bell is but sparing as yet, but it is likely to lead to great results.

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* Quicksilver mines exist at New Almaden, in California, and the gold mines of California and Australia will be supplied with quicksilver for amalgamation at cheaper rates, and quicker than from the mines of Europe.

From the description of the operations, it will be seen that the effectiveness of the work depends wholly on the quantity of rude labour employed, and that it is only suited to canal diggers, excavators, and miners. With others it can be but a matter of gambling; for, wanting the bodily strength needful to get through the steady work, they hunt about for gold in the hope of getting a lump which may make them rich for a time, though it cannot be for long, as the gambling itch which led to this gold hunting, leads them to stake their winnings at the play-table, and they have to begin their wanderings and hardships anew.

It may, however, be said that there is another condition which admits of gold washing, and that is, where a slave, as in the Brazils, or ill-fed Hindoo, works for a bare subsistence. This, however, seldom yields an income to a master, or revenue to the tax-gatherer; and the whole yearly produce of such labours is always inconsiderable, being perhaps a few thousand pounds for a large district.

In the case of quartz crushing, which is chiefly carried on in California, it is applied to rocks in which the gold is more or less thickly spread about; and the purpose of crushing or stamping is to reduce it to the condition of sand for streaming, so that, being washed like the gold sands, the rock may be swept away, and the gold left behind. This allows of a still greater application of mechanical power, because it is worth while to carry the ore some distance to the stamping machine, whereas, though the cradle may be taken from one washing to another, yet the bulk of the cradle is kept down by this condition of being removed; the stamping engine, however, can work for a large district round. In California it has been found worth while to set up steam engines, supplied with fuel from the neighbouring pine woods, or with Vancouver Island coal, but the chief difficulty is in getting together workmen to keep the engines in repair. Whether steam engines can be so worked in the inland of New Holland is not as yet known; for, though coal is worked on the shore at Newcastle, the land journey to the diggings would be too costly. If, how-

ever, gold working could be established low down on the Murray, then coal from Van Dieman's Land could be steam-towed up the river as far as the junction of the Murray and the Darling, and perhaps higher.

The crushing is applied to superficial rocks which are seen to have gold sparkling in them, and which are broken off by picks, or blasted with gunpowder. This kind of work is therefore very much like what is carried on in Cornwall, and fitted for such a population.

Gold mining is carried on in the common way, by driving shafts, galleries and levels on lodes and veins of the ore; but which, being very narrow, seldom pay for the working, though a chance lump or pocket will sometimes encourage working for a time. As the lodes are subject to the contingencies of other lodes, the mineral vein is often found to run down poor, or to be broken off. The ore when obtained is broken up, crushed, and washed, to obtain the gold by its greater weight. Amalgamation with quicksilver is sometimes resorted to, but is most commonly applied in reducing silver.

§ 4. THE GOLD MONETARY QUESTION.

While the penniless look with hope on California and New Holland, the wealthy hear of them with dread. To the former they hold forth the chance of getting money, to the latter, fear that the value of their stores will be diminished. Among the many extraordinary incidents connected with the Californian discoveries, was the alarm communicated to many classes; which was not confined to individuals, but invaded governments. The first announcement spread alarm; but, as the cargoes of gold rose from a hundred thousand dollars to a million, bankers and financiers began seriously to prepare for an expected crisis. In England and the United States the panic was confined to a few; but on the continent of Europe every government, rich or poor, thought it needful to make provision against the threatened evils. An immediate alteration in prices was looked for; money was to become so abundant,

that all ordinary commodities were to rise, but more especially the proportion between gold and silver was to be disturbed, some thinking that the latter might become the scarcer metal. The governments of France, Holland and Russia in particular turned their attention to the monetary question, and in 1850 the government of Holland availed itself of a law which had not before been put in operation, to take immediate steps for selling off the gold in the Bank of Amsterdam, at what they supposed to be the then highest prices, and to stock themselves with silver.

This operation was carried on concurrently with a supply of bullion to Russia for a loan, a demand for silver in Austria, and for shipment to India, and it did really produce an effect on the silver market, which many mistook for the influence of California. The particular way in which the Netherlands operations were carried out was especially calculated to produce the greatest disturbance of prices. The ten florin gold pieces were sent to Paris, coined there into Napoleons, and silver five franc pieces drawn out in their place. At Paris the premium on gold in a few months fell from nearly 2 per cent. to a discount, and at Hamburgh a like fall took place. In London, the great silver market, silver rose between the autumn and the new year from 5*s.* per oz. to 5*s.* $1\frac{5}{8}$*d.* per oz., and Mexican dollars from 4*s.* $10\frac{1}{2}$*d.* to 4*s.* $11\frac{5}{8}$*d.* per oz.; nor did prices recover until towards the end of the year 1851, when the fall was as sudden as the rise.

As yet the large importations from California have produced no effect on prices, because the operations of California have opened a vent for a considerable portion of the Californian bullion. In California a large amount was kept in stock, and a large amount was wanted for currency, prices being so enhanced. The trade created in the Pacific likewise took off a large amount of Californian bullion, which was absorbed into the currency. In Chile alone the value of imports to California was very large, and was paid for in gold; indeed the gold of California went to every market of the Pacific, and gold dust was soon regularly quoted in Valparaiso, Lima, Tacna, Canton and Madras.

Europe and the United States were capable of taking a large amount of bullion for currency, as the banks held stocks below their full amounts; but it was noticed, that throughout 1850 and 1851, the general stock of bullion in the banks did not show any increase corresponding to the exports from California. Political distrust has caused hoarding in some districts, while in some others, where a paper currency does not prevail, greater social prosperity has created a demand for more bullion, besides the demands for purposes of luxury. Thus, hitherto, the supply of California has met with a ready circulation, but in a time of full confidence and steady peace the results would have been otherwise.

Of the total yearly yield of gold no accurate estimate can be made. In 1800 the whole yield of gold and silver was estimated at £10,250,000. The following is an estimate of the yield of gold and silver for each of the following years:

	Gold.	Silver.	Total.
1840 ...	£5,000,000 ...	£6,750,000 ...	£11,750,000
1848 ...	7,000,000 ...	6,750,000 ...	13,750,000
1850 ...	17,500,000 ...	7,500,000 ...	25,000,000
1851 ...	22,500,000 ...	7,500,000 ...	30,000,000

The whole stock of bullion of gold and silver now in circulation, is estimated by various economists at £400,000,000, but complete data are wanting.

The chief supplies of gold are, at present, from California, about 75 per cent.; from Russia, 17 per cent.; Australasian Archipelago, 4 per cent.; Mexico and South America, 4 per cent.

§ 5. GOLD IN EUROPE.

The supply of gold from Europe has never been great. In the earliest historical period, some small amounts were obtained from river washings, for a long time, from Spain; but at the present day, the only scanty supplies are from mine workings.

In England, small particles of gold are sometimes found in the Cornish mines and tin streams, at Carnon Vale and at South Molton, in Devon, and in Wales they are found dissemi-

nated among the rocks in Merionethshire and elsewhere; but hitherto gold has not been considered worth working—silver being the only precious metal obtained to any extent, and that of late years only. The gold ornaments of the Iberian and British chiefs, found in tombs, are supposed to have been got from river washings, and being rare, it is not thought that gold was at any time found on a large scale here. From the Cwmhusian mines in Merionethshire, seven pounds weight of gold have lately been obtained. Gold is said to have been found at Pollux Hill in Bedfordshire, at Little Taunton in Gloucestershire; and on Sheepstor, Dartmoor. Of the gold of the Leadhills, in the south of Scotland, worked under the Scottish kings, there are specimens in the British Museum.

The only remarkable gold district in Ireland is on the east shore in Wicklow. The richest deposit, as usual, was found on the banks of the rivers, an accidental discovery being made in the Ballinvalley streams at Croghan Kinshela, in 1796. The total value raised did not probably exceed £10,000, and was soon worked out. Attempts were made to carry on gold mines in the primitive formations, but they did not pay. In Croghan Moira mine, about seven miles from Kinshela, gold was likewise found in small quatities. Indications of gold are said to have been found in the Miola rivulet in Ulster, and in the Shannon at Inchmore.

In France, gold is likewise found at Gardette in the Isere, but not in sufficient quantity to pay the expense of working. In the rivers of the Rhone, Rhine, and Garonne, there is auriferous sand, and in those of the mountains of Cevennes and Languedoc.

The rivers of Spain and Portugal—more particularly the Tagus, Douro and Darro—have gold sands; but they are not now wrought. At Adissa, in the St. Ubes district, a gold mine was for some time worked: the produce in 1815 was 41 lbs.; 1816, 18 lbs.; 1817, 11 lbs.; 1818, 12 lbs.; 1819 13 lbs.; 1820, 12 lbs.; 1821, 18 lbs. The total value of the produce in seven years was only about £5000. In

Arragon, Leon, Andalusia, Granada, and Galicia, are gold mines. It is probable dry diggings may be found in Spain. The mine of Domingo Flores, in Leon, was worked from 1639 to 1749. At Culera in Gerona is gold quartz.

Except in the Alpine regions, no considerable traces of gold are found in Italy; nor are there any workings. There are no traces of gold in Italy. In Savoy, it is reported river deposits have been lately discovered; and gold is said to be at the foot of Mount Rosa. In Sicily, a mine, stated to have been formerly worked for gold, lies in the mountains north-west of Taormina. Pesterana, in the Alps, is one of the oldest gold mines—the gold being scattered in sulphuret of iron.

In Germany and the Germanic states, gold has been found in many localities, and was formerly extracted to a great extent in Bohemia. It is also obtained from the Hartz, the Mulda, Bavaria, and Baden. Gold is got from the arsenious ores of Silesia. In Hungary, gold is raised from the mines of Schemnitz and Kremnitz; being the richest for this mineral in Europe. The yield is taken at 1050 lbs. of gold yearly, worth £35,000. In 1848, 40 lbs. of gold was found in granite, in Salzburg, and 3 lbs. in Illyria. Transylvania is another rich district, and yields 1375 lbs. of gold yearly. In the Banat of Temeswar, 60 lbs. of gold was obtained in 1848. The gipsies are the chief gold washers. One estimate of the whole produce of gold in Austria is 4000 lbs. yearly; and in twenty-six years, 85,000 lbs. In Bohemia are gold washings on the Iser. In Salzburg are gold mines, which yielded 35 lbs. of gold yearly. In the Tyrol are gold washings, two miles from Zell. In the Danube are washings between Vienna and Pesth.

In Sweden there are several gold mines. That of Adelfors, in Smaland, formerly yielded 15 to 20 lbs. of gold yearly; but now, it is said, only 1 or 2 lbs. The working began in 1738. The Fahlun mines yield about 2 lbs. yearly. Gold is here found with copper, as in Cornwall. In Norway is the gold mine of Edswold, in the Rommarge district. Stream washing does not seem to have been tried in Scandinavia. At

Kongsberg, in Norway, gold has been found, which was coined by Christian IV. The lode is found in quartz.

Turkey has gold in several districts. The best known deposit is that of the river washings in Bosnia, where it is found among sand and pebbles; but the country is so disordered that no gold is produced. It is likewise found in Thrace, Macedonia, and at Siderocapso, near Salonica. Cyprus and Thasus have been already mentioned.

In Russia, the chief gold deposits are on the Asiatic side of the Ural Mountains; but in 1739 a gold mine was found and worked in Olonetz.

The total produce of Russia from Europe and Asia, was, in the beginning of this century, estimated at 42,675 lbs., or about £1,800,000 yearly. In 1830 the amount was estimated at 15,000 lbs., and at the like amount in 1831; in 1835, at 12,280 lbs.; in 1842, at 41,000 lbs.; in 1843, at 55,000 lbs.; in 1847, 73,300 lbs.; in 1848, 75,600 lbs.; in 1849, 69,600 lbs.

The production of gold in Russia in 1847, was about £4,000,000; in 1848, something more; and in 1849, about £3,500,000.

§ 6. SIBERIAN GOLD REGIONS.

The chief Russian gold districts are two—those of the Ural chain on the west, and those of Nertchinsk and Kholivan, in the Altai, on the east. The resemblance of the Ural district to California is remarkable, and has been pointed out by several eminent men. The workings are stictly gold diggings, with one small exception near Ekterinburg. The ancient gold drift has been spread over a surface of many square miles, in the basins of the rivers Grande Birussa, Upper Tongooska, Ooderei, and Pite, in the Yenissei province of Siberia. With the exception of the districts belonging to the imperial mines of Kholivan, Voskressensk and Nertchinsk, and the country beyond the Lake Baikal, the gold findings throughout Siberia are thrown open to private enterprise. The chief discoveries in this district were

made in 1829; but being under regulation, they did not give a general stimulus to gold washing. That was reserved for California.

The following shows the gradual produce of gold from Siberia:—

1829	...	55 lbs.	1837	...	5,828 lbs.
1830	..	465	1838	..	8,460
1831	...	453	1839	...	8,025
1832	...	965	1840	...	11,202
1833	...	1,600	1841	...	15,720
1834	...	2,871	1842	...	27,732
1835	...	4,054	1843	...	40,868
1836	...	4,610			

The difference between these amounts and the totals before given, will pretty nearly represent the gold produce of the Ural at the several periods.

§ 8. GOLD IN ASIA AND AUSTRALASIA.

The gold districts of Asia are chiefly those of Siberia, already described.

In Hindostan, gold is found in several regions, and it may be said in every river system. In the basin of the Indus, between Attock and Kalabagh, 300 people are employed in washing the sands, the gold being chiefly in flattened grains or scales, and yielding 2,000 oz. yearly. In the basin of the Ganges gold is found, as in the Goomty, Ramgunga, and other rivers at the foot of the Himalayas, where washings are carried on. Native gold is here likewise found in the gneiss, which is traversed by veins of granite, and distinctly stratified. On each coast, and in the heart of the Dekkan, gold is found and worked in several localities. Among these may be enumerated the river workings of the Paliaur and Poniaur, rivers in eastern Mysore; of Nolampoor, Kapoor, Srussumjee, Polwye, Tirumpaddy, and other rivers in Calicut and on the Malabar coast; of Malapuram in Nedingabad; of Kadalaonely and Parpanangady, on the south shore in Shernaad; of Kahil, Aripanad, and the Tirumaly Hills, besides twenty

river works in the Ernaad district. Of these latter, the yield was 62 lbs. in 1834.

Gold is further found in our Assam provinces, the river sands being washed. The yield is said to be about 38,000 oz. yearly.

In China, gold is worked in the river sands of Sechuen and of Yunan, near the Tibet borders, and in the Burmese rivers on the frontiers.

In Tibet, gold is found in dust in many of the rivers, and likewise scattered in lumps and grains, in quartz and other rocks. The gold is here worked, but the yearly yield is not known.

In Malacca, gold is found at Naning, Pahang, Tringanu, Calantan, Battang, Moring, and in other localities; and the yearly return is estimated at 26,000 ounces. There is gold quartz at the foot of Mount Ophir.

Gold, it is known, is produced in Japan, and in quantities sufficient for home purposes; but the yield is supposed to be falling off. The chief gold works are in a pyritic ore of copper; but there are likewise diggings in the alluvial soils. The Japanese copper has been often found to contain gold.

Throughout Australasia gold is found, abounding most in those islands which are composed of primitive and transition rocks; being richest in the western and northern islands, and least abundant in the eastern islands, though it is met with in Java. Borneo is the richest of these gold regions; and it is worked at Banjarmassin and Pontianak, chiefly by Chinese mining companies. The gold is found in veins and mineral strata, in the sands and beds of rivers, and in dry diggings. Above 6000 Chinese have been employed at one time in these workings; and the yield is estimated at 9000 lbs. yearly, or £375,000. In Sarawak in 1849, 2,000 men got £30,000 worth of gold from the detritus of Mount Trian. The yield of the Sumatra mines is taken at 3000 lbs., or £131,000 yearly; and of the other mines in the several islands, about 4000 lbs., of which Celebes 800lbs.; Timor, 80lbs.; and the Philippines, 1200lbs.

Gold is known to exist in New Guinea, but details are wanting. It is likewise said to have been discovered in New Caledonia.

§ 9. TOPOGRAPHY OF THE NEW HOLLAND GOLD REGIONS.

The chief New Holland gold diggings hitherto reported being connected with the basin of the River Murray, it becomes useful to give some account of that river system. This river may justly rank among the great ones of the world, and is the greatest on the New Holland main land, of which it may be called the Mississippi. The extent of its basin is by no means known, its eastern feeders being those with which we are least acquainted. To the east it reaches beyond 151° east, approaching the shores of New South Wales; to the north a feeder has been found in 25° south lat., and on the south its mouth is in 35° south lat., though some of its feeders in the Victoria province are as far south as beyond 37°. On the west its mouth, and probably many main feeders, reach to 139° east longitude. The area of the basin at a mean is not less than 1,400 miles, from north to south, and 400 from east to west, covering between 500,000 and 600,000 square miles, or a district five times the area of these islands, and four times the extent of California.

The shores of the Australian mainland, where chiefly settled, are girded in within 100 miles of the sea by a belt of hills, having short water-courses to the sea. On their inland, or east side, all the waters are feeders of the great Murray, and have a long course before their waters reach the sea. For a considerable distance they flow among the mountains, but after a space open out on large sandy plains, in which sometimes the waters are lost.

The Murray River system may be chiefly divided into two great parts. The rivers of the north and north-east all flow into the Darling, and those of the south and south-east, from southern New South Wales and Victoria, into the Morumbidgee, or Upper Murray. These two great arms uniting form the Lower or main Murray, which forming near t e

sea a large lagoon, called Lake Alexandrina, discharges itself by several mouths into the sea south-east of Adelaide, in South Australia.

§ 10. HISTORY AND DESCRIPTION OF THE AUSTRALIAN GOLD REGIONS.

The resemblance of the Australian formations to those of the Ural was first remarked by Sir Roderick Murchison, who was so strongly impressed with the fact, that he felt it his duty to allude to it, in the address which he delivered to the Royal Geographical Society, as President, in May 1845. In the subsequent year he specially addressed the Cornish Miners on the subject, and adverted* particularly to the discovery of gold near Bathurst, on the western flank of what he styled the great Australian Cordillera; and he strongly urged the propriety of a strict geological investigation, with the view of establishing gold workings. Colonel Helmersen, of St. Petersburgh, a member of the Russian Academy of Sciences, also well acquainted with the Ural gold works, expressed the same opinion. The views of Sir R. Murchison obtained great publicity in Australia; but it is to be regretted the English government is not in the habit of taking counsel from men of science, so that the opportunity was lost, of taking all due and timely advantage of the discovery.

The Rev. W. B. Clarke also published letters, suggesting a theory of the gold deposits, in which, following Sir Roderick Murchison, and taking the Russian deposits as a basis, he predicted gold deposits in California and Australia. He likewise points out the Equator as a great gold region; and this, too, the best practical authorities confirm.

Mr. Francis Forbes, of Sydney, about two years ago published and circulated in New South Wales a paper, in which he affirmed in the strongest manner, on scientific data, the

* See also Transactions of the Royal Geological Society of Cornwall, 1846; and Transactions of British Association of Advancement of Science, 1849.

existence of gold formations in New Holland. Mr. Forbes, not being listened to nor encouraged in his researches, went to California, where he died in 1850.

Even the discoveries in California did not arouse the New Hollanders to adequate researches, though reports were spread of wonderful discoveries in Victoria and South Australia, which were speedily discredited. It was reserved for a gentleman of New South Wales, Mr. Edward Hammond Hargraves, to make the definitive discoveries. He appears to have acted independently of all previous views on the subject; but having acquired experience in California, and being struck with the resemblance between the Californian formations and those of New Holland, he determined on a systematic search for gold, which he brought to a successful issue on the 12th of February of this year, by the discovery of gold diggings in the Bathurst and Wellington districts, and which he prosecuted until he had ascertained the existence of gold sands in no less than twelve places.

Mr. Hargraves stands undisputedly as the first explorer of the Australian diggings; though, as already stated, gold ores had been already found in many places, and especially near Bathurst. Having finished his explorations on the ground, he drew up a regular report, which in April he laid before the Governor-General, who, after some consultations, sent the colonial geologist, Mr. Stuchbury, to make a further scientific investigation, which has resulted in a full confirmation. At a later period, the Surveyor-General, Sir Thomas Mitchell, and staff, took the same route.

The proceedings of Mr. Hargraves and of the government got spread about, and on the 1st of May of this year—on the day of the opening of the Great Exhibition, and five years after Sir Roderick Murchison's Cornish address—it was made known in Sydney that great gold discoveries had been made in the interior, when a period of wild speculation immediately commenced. In the Bathurst district, active operations had already begun, and hundreds successfully proved the gold diggings. It is well enough known that a Californian excite-

ment has prevailed there, which it is unnecessary to detail. In the beginning of June, the Governor-General made a grant of £500 to Mr. Hargraves, and afterwards an appointment of £350 a year; and at the same time the Sir Thomas Arbuthnot sailed from Sydney for England, with £4000 worth of gold among her cargo.

The locality of the gold diggings first reported, is in the upper basin of the Macquarie. On the head stream of the Fish river will be found Bathurst, and to the left of it, a small stream, about forty miles long, which runs from the Bathurst road at Pretty Plains to Lewis Ponds. This is the Lewis river. Its western feeder is the Summerhill Creek, which, soon after the discovery, was beset with 4000 gold diggers, and from which the first exports were obtained. The width of these creeks, at their junction, is reputed to be about fifty or sixty yards, and the water sometimes rises suddenly twenty feet. The diggings extend downwards all the way to the Macquarie. Swallow Creek is the locality of another digging. These Macquarie diggings are called Ophir.

The mountain ranges near here run high, the neighbouring Mount Canobolus being 4461 feet above the sea. It is a matter of considerable importance, that gold is also reported as occurring in the feeders of the Lachlan, which rise on the south side of the range. In the Narrambla, near Carceon, south-west of Bathurst, diggings were begun, so that it may be expected that gold will be found in the Lachlan valley.

Besides the indications in the valleys of the Murray, on the western side of the Rocky Mountains, there are reports of gold on the eastern side, more particularly in several parts of the Hunter river—one of the chief rivers of the coast, flowing through the colliery districts to Maitland and Newcastle. Several of the heads of the Hunter rise close to those of the Macquarie. Gold is reported as low down as Maitland. It is likewise reported at Bondi, six miles from Sydney, and in the neighbourhood of Melbourne.

Arrangements have been already made to operate largely in the gold districts. The first company formed in London is one called the Australian Gold Amalgamation Company, in

which it is intended, under the direction of Messrs. John Taylor and Sons, the mining engineers, to apply the experience gained in their mines in Mexico and Spain in the reduction of bullion with quicksilver.

§ 11. CANADIAN GOLD REGION.

In 1850, the discoveries of gold in La Chaudiere River, in Canada, being confirmed, a company was formed, and in 1851 specimens of the stream gold were shown in the Great Exhibition by Mr. Logan, the Government geologist, and by the Chaudiere Mining Company. Subsequent researches have proved that this gold basin is of considerable extent, reaching into Maine, and yields auriferous quartz.

§ 12. VIRGINIAN GOLD REGION.

The eastern gold region of the United States is considered to begin in Virginia, extending all through North Carolina, along the northern part of South Carolina, and thence north-westerly into Alabama, terminating in Tennessee. This district has been long known, and consists chiefly of diggings, but which are supposed to be pretty well worked out, though very productive at times. The population of this district have long been marked as "gold hunters." A lump from a branch of the Rocky River weighed 28lbs. The gold hunters here introduced the practice of making dust a currency. Quartz gold is found in Virginia, besides river gold. In consequence of the productiveness of the Virginian region two mints were set up in 1835, for the coinage of gold; one at Charlotte, in North Carolina, and the other at Dahlonega, in Georgia.

The Virginian workings, which had been small, in 1830 reached $466,000, or about £100,000; and in 1843, $1,200,000, or a quarter of a million; the whole up to that period being $10,000,000, or £2,000,000.

§ 13. CALIFORNIAN GOLD REGIONS.

The existence of gold dust in New California was known at an early period; having been found by Captain Shelvocke, one of the English privateers in Queen Anne's time. The

country, however, not being settled by the Spaniards, but remaining first in the hands of the wild Indians, and afterwards of Indians dwelling at the missions or "presidios" of the Jesuits and their followers, no workings were carried on. In 1820, California was made a territory of the Mexican commonwealth, and a small party of adventurers came in; but so far from working for gold, or otherwise improving the country, they disorganized the missions, and the Indian settled population rapidly decreased. Nearly twenty years ago, a few English stragglers began to settle there, being mostly fur-trappers from the States, or whalers; and on the 4th of November, 1836, Isaac Graham, a New Englander, at the head of thirty trappers and sixty native rancheros, took Monterey, put down the Mexican government, and declared California independent, with the view to annex it to the United States. This, however, did not succeed; but the revolutionists divided the country among them. In 1840, a petty war broke out between Graham and the Spanish party under Alvarado, when the former took the field at the head of forty-six men—twenty-five from Old England and twenty-one from New England. Alvarado, however, carried the day; but in 1841 a hundred New Englanders arrived from the west, and Alvarado obtained, as a military aid from Mexico, three hundred convicts. It was this Alvarado who disposed of his rancho to Col. Fremont. In 1842, Commodore Catesby Jones, of the United States Navy, on a rumour of war, took possession of the town of Monterey; but he afterwards gave it up. In the war with Mexico in 1846, the United States, however, at once took possession of the country, and it was confirmed to them by treaty in 1848.

Captain Shelvocke, it is to be remembered, was quite forgotten; though he affirmed that the black sands of the rivers yielded gold largely, and that the whole country abounded with gold. Nevertheless, gold workings had been carried on, though no attention was paid to the streams. In 1825, gold ore was worked by a Mexican, in a mine at St. Isidore, near St. Diego; but through the disturbed state of the country, little was

done. In 1840, a small thread of gold was wrought in the district of St. Barbara, but not to any extent. Before the annexation of California, a considerable English population had already flocked in, in connection with the events narrated above; but they were drawn only by the natural promise of the country for grazing and tillage, and by its convenient situation for extending Americo-English power and trade in the North Pacific, for which it has attracted attention from the time of Sir Francis Drake downwards. The re-discovery of the gold diggings took place by accident, and not as in the case of New Holland, from a determined investigation.

The discoverer was Mr. Marshall, who in September 1847 had contracted with Captain Sutter to build a saw-mill, near some pine woods, on the American Fork, now a well-known feeder of the Sacramento river. Captain Sutter, whose name has likewise become connected with this romantic history, was a Swiss, and officer of Charles X.'s Swiss guards, forced to emigrate in 1830, and who, shifting his settlements in the States, had reached the Columbia, and in 1839, California, where he built a fort for trade, which he called New Helvetia. In 1843, he had there a garrison of thirty whites and forty Indians, with twelve pieces of artillery, 4,000 oxen, 1,500 horses and mules, 2,000 sheep, and two trading vessels, besides much land under crop. This place, since called Sutter's Fort, is now the seat of a great and thriving town in the gold diggings.

In the spring of 1848, the saw-mill was nearly ready, the dam and race being constructed; but when the water was set on the wheel, the tail-race was found too narrow to let the water through quick enough. Mr. Marshall, to save work, let the water right into the race with a strong stream, so as to sweep the race wider and deeper. This he did, and a great bank of gravel and mud was driven to the foot of the race. One day, Mr. Marshall, on walking down the race to this bank, saw some glittering bits on the upper edge, and having gathered a few, examined them, and conjectured their value. He went down to Sutter's Fort, and told the captain; and

they agreed to keep it a secret until a certain grist-mill of the captain's was finished. The news got about, however; a cunning Yankee carpenter having followed them in their visit to the mill-race, and found out the gold scales.

Forthwith the news spread. The first workmen were lucky, and in a few weeks some gold was sent down to San Francisco, and speedily the town was emptied of people. In three months there were four thousand men at the diggings, Indians having been hired, eighty soldiers deserted from the American posts, and runaways getting up from the ships in the harbour. Such ships as got away carried news to Europe and the States, and by the beginning of 1849 both sides of the Atlantic were in agitation. The subsequent growth of San Francisco and Sacramento, the wonderful shipments of gold dust, the establishment of California as a state of the Union, the founding of Deseret as another state by the Mormons, the throwing open of the Panama route to traffic, and the Nicaragua lake and river to navigation, and the development of the semi-English states of Hawaii and Mosquitia, are facts as familiar as household words. The red cross of St. George and the stripes and stars are now marking out a new empire for us on the Pacific, and the day is not perhaps so far off, when we shall be able to put forward as stronghanded a claim to the lordship of the great ocean as of the narrow seas.

The gold diggings of New or Upper California now embrace the whole basin of the Sacramento, which consists of a great northern and southern river, each flowing among the mountains, and discharging its waters through a westerly channel into the Bay of San Francisco. These two streams have many small brooks or feeders in the mountain gorges and steep dales, and all, so far as is yet known, yielding gold.

The geological formation of the country belongs to the primary series, and the chief rocks are granite and quartz. In so far the resemblance in general between California and the other gold yielding countries is complete; but whereas, in most other cases gold mining is unproductive, the veins when found, however widely spread about, and however much they

may hold as a whole, being unproductive for working in detail, yet, in California the rocks are ascertained to be a fertile source of metal. It is peculiar to California, that the process of quartz-crushing has been introduced and carried out on a large scale; and it has this advantage, that as it requires large and expensive machinery, capitalists can take part in it, though the limit of their profits is necessarily the tribute or portion at which the miner will supply the quartz rock, unless as in the case of the great companies, the quartz belong to the proprietors, when the profits made are enormous, and almost beyond belief. The success of these quartz operations has turned the attention of gold-finders in another direction, and now, where gold-stream works are discovered, researches are likewise made for gold-bearing rocks in the neighbourhood.

Some of the chief quartz workings are in Nevada and Mariposa counties, but the best known are on the rancho or large estate bought by Colonel Fremont from Alvarado, the Mexican governor. They are those of Mariposa, Agua Fria, Nouveau Monde, West Mariposa, and Ave Maria; the first leased by an American company, the third by a French, and the others by English companies. Some of the quartz has been assayed for £7,000 in the ton of rock. A Mariposa specimen was in the Great Exhibition.

The Agua Fria mine, the lease of which was granted by the Hon. Colonel Fremont to Messrs. Palmer, Cook and Co., bankers, of San Francisco, is held by an English Company. This property is situated on the small river of that name, which is a branch of the Mariposa, and is about eighty-five miles from the city of Stockton, to which place vessels of 400 tons can navigate, and between which and San Francisco there is almost daily communication by steam-packets. This mine was surveyed and examined by Captain W. A. Jackson, the well known engineer, of Virginia, U.S., in October last, for which purpose openings were made by a cross-cut, of sufficient depth to test the size of the vein and richness of the ore. The vein appears to be of nearly uniform thickness of from

three and a half to four and a half feet, and its direction a few points to the north of east, the inclination of the vein being about 45 degrees.

Of the ore, some specimens were transmitted to the United States Mint in January 1851, and the report of the assays then made showed that 277 lbs. of ore produced 173 ozs. of gold, value $3,222, or upwards of £650 sterling.

In the month of May, a quantity of the quartz was brought over to this country, and submitted to the inspection of the Governor of the Bank of England, under whose orders it was assayed at the Bullion Office; and the result was, that the different specimens, which were of three classes, and weighed in the aggregate 24 lbs. 2 oz. 2 dwts., yielded gold to the value of £272 2s. 7d. A further assay was made of a quantity of the quartz from the Agua Fria mine so recently as September 1851, by Messrs. Johnson and Matthey, of Hatton Garden, which their certificate states to have been of specimens of the quartz "selected as being below the average richness of the whole mass," was, that a weight of rock of 5 lbs. 4 oz. 18 dwts., yielded 1 lb. 4 oz. 12 dwts. of gold, or a value of £63 1s. 10d., less the expenses of separation.

Another analysis of the quality of the quartz rock taken from the Agua Fria mine has been made by Prof. Ansted, of King's College, London, who examined the specimens and estimated the value by calculation of the specific gravity, and further obtained the absolute specific gravity of the quartz rock by an investigation conducted by T. H. Henry, Esq., F.R.S. The result of these investigations was as follows:—

	Weight of Specimen.			Spec. Grav.	Estimated Wght. of Gold.		Estimated Value.		
	lbs.	oz.	gr.		oz.	gr.	£	s.	d.
No. 1.—	26	10	78	2. 70	17	346	65	7	0
2.—	13	12	390	2.668	6	110	23	2	6
3.—	2	7	107	2. 64	0	282	2	7	9
Total -	42	14	138		24	300	£90	17	3

This gives the mean specific gravity of the three lumps 2·695, and the mean value about 42*s.* 6*d.* for every pound weight of ore, and therefore a value of £4,750 for the ton.

The contents of the vein running through the property, which is about 600 feet in length, and crops out on a hill, rising about 150 to 200 feet above the level of the Agua Fria Creek, is estimated at about 18,000 tons of ore to the water level only, and how far it may descend below, that is not at present known. It has been stated that English capital is about to be applied to the working of this mine, and if only a small portion of the ore in the large mass of rock—which, by the report of Captain Jackson, the mine appears to contain—should prove equal to that which has been assayed by the Bank of England, the result must prove abundantly remunerative to the parties who have embarked in it.

Another mine on Col. Fremont's estate is that called the Ave Maria; negociations for leasing which to a London Company have been carried out. This mine is situated on a bluff, rising from the banks of the Ave Maria, a fork of the Mariposa river, near Stockton, in Mariposa county. The boundaries of the mine have been marked out and taken possession of by the lessee, who is bound to pay a royalty of one sixth to Colonel Fremont. It is stated, that besides gold found extensively in the outcrop, the quartz wherever opened is extremely rich, and has been traced down the ravines for above seventy fathoms.

The Mariposa Mines are near Mariposa city, and are leased from Col. Fremont by Messrs. Palmer & Cook. These were the first quartz mines worked; and a steam engine has been set up. Rich assays have been made, and considerable proceeds obtained; though, in the first instance, a difficulty was experienced in obtaining labour and efficient machinery. The Company had a steam-stamping mill and a Chilean mill set in action in September, 1850.

On the Ave Maria is likewise the location of Messrs. Stockton and Aspinwall, who have set machinery to work.

The Philadelphia and Californian Mining Company have a capital of £100,000; and have sent out machinery to their works which are near the Mariposa.

On the south side of the Agua Fria are the works and machinery of Messrs. Worths, of Virginia, who have a good vein.

The West Mariposa Mine under Col. Fremont's lease has a vein of quartz which runs the whole length of the allotment, averages six feet in thickness, and has been opened in several places. The assay of Messrs. Johnson & Matthey states, that a poor specimen of 11 oz. 9 dwts. 18 grains, produced gold, 2 dwts. 17 grains, which would give £1,347 per ton: and a rich specimen, weight 17 oz. 12 dwts., gave 3 oz. 15 dwts. 9 grains, being at the rate of £24,482 per ton.

The works of the Great Anglo-French Company, the Nouveau Monde, are in the Mariposa district, between those of the Mariposa Company (Palmer & Cook's) and those of the Agua Fria; and likewise on the estate of Col. Fremont. The location is about three quarters of a mile west of the city of Mariposa, and near the Mariposa river, being a continuation of the great Mariposa lode or veins, which is traceable for three or four miles from the Ave Maria Creek, westwardly to the Agua Fria river, according to the report of Mr. Wm. A. Jackson, the mining engineer. Included in the lease is Baldwin's Mine, which has yielded specimens containing gold to the amount of £9 sterling, to the pound weight of quartz ore. Other assays of common rock give severally 10 to 15 dwts., and $3\frac{1}{2}$ to 4 dwts. of gold to the 100 lbs. of ore, or as there called the miner's bushel.

The total shipments of California for the year 1850 are estimated at $48,000,000, or £10,000,000, and those for 1851 at a higher rate.

§ 14. SOUTHERN AMERICAN GOLD REGIONS.

The west coast of America is, perhaps, the region having the greatest number of gold deposits, whatever may be the most productive district, a fact which experience alone will settle. At any rate, between 20° to 45° north lat., gold is found everywhere, so far as has been tried in the valleys and

ravines, and indeed over many regions of the south the same remark holds good. In Ecuador, in Bolivia, at Carabaya and other places in Peru, great gold deposits have been recognised.

The grand chain running from south to north, through the mainland of America,* and which may be designated the Great Cordillera, belongs, so far as is known, chiefly to the primary formations. This immense extent includes several gold regions, which may be thus classified: New California, the Peninsula of Old California, Mexico, Central America, New Granada, Ecuador, Peru, Bolivia, and Chile. These, as yet, have yielded to the world the largest supplies of gold.

New or High California is separately described. Of Old California but little is known; still the same geological formations are continued through it, and gold has been recognised. Some believe that gold is more abundant than in the other California. At Moleje there are gold workings.

Mexico and Central America may be considered together. In the north we have the rich gold region of Sonora, the workings of which are given up since the inroads of the Indians. These districts are traversed by a chain of mountains, in a line due north, forming part of the great back-bone of the Cordilleras, and which sends out a great number of steep spurs, running in a north-east and south-west direction, and forming deep ravines or high table lands, as may be seen on the Great Model of the Earth. The plains, or "llanos," at the base of these Rocky Mountains, are composed of limestone, overlying granite; but in lower latitudes they are superstratified with serpentine and greenstone trap. In the Sierra Nevada, another part of the chains, the rocks are composed of granite, quartz, porous trap, or basalt. The granite of that region is composed of white quartz, felspar, and black mica, and like all the others is gold bearing. These granites being likewise of a granular and loose structure readily un-

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* Wyld's Popular Atlas.

dergo decomposition. Some of the peaks under the line are of perpetual snow, and generally the lower levels are at such an elevation that during a great part of the year they have a thick coating of snow, which exercises an action on the granite. At the time of thaw, and in the rainy season, lasting from November to March, floods of water sweep from the mountain tops, and along their sides, through the deep gullies and ravines, into the valley, carrying with them the worn rock and the broken gold veins, with which the lower basins are yearly flooded.

Sonora and Sinaloa, in North Mexico, may be considered as closely connected with California, lying in the Californian Gulf. Many mines are known there, though the working is now interrupted, but a strong body of Americo-English having gone there, they may be soon taken up again. Among the mines known are Triarte, Rosario, Corala, Alamos, Hermosillo, and Guadalupe y Calvo. It is said that in 1839 as much gold and silver was assayed in the government establishments of Hermosillo as was worth £400,000. The gold workings of Quitovac and Sonitac, to the north of Arispe, were discovered in 1836, aud for three years yielded £700 worth of gold daily. Catorce is likewise rich in gold. In Guanaxuato in the last century, 1,000 lbs. of gold were yearly coined, but in this 300 only. In this province, where the veins are worked principally for silver, the ores are frequently found to be very rich in gold, which is separated in the grinding process by putting quicksilver with those into the arrastres, or grinding mills, thus producing a mechanical amalgamation of the gold with the quicksilver, which amalgamation is afterwards separated by washing. This process will probably be applied in California with good effect.

The production of gold in Mexico in 1844 and 1845, was about $1,300,000 yearly, but in what proportions obtained is not known.

In Central America gold is worked at Del Aquacato in Costa Rica, and elsewhere. In 1823, the yield was 72lbs.; 1824, 263lbs.; and 1825, 260lbs.

In New Granada gold is found in the Central and Western Andes. In the basin of the Rio Cauca are river washings, and gold is to be had in the Rio Zulia and Rio Hacha. In the mountains of Antioquia it is obtained by mineral washings; the yield is about £500,000 yearly.

The gold coinage of the mint of Bogota in New Granada is as follows:—

1810	...	$1,004,969	1818	...	$837,494
1811	...	1,017,753	1819	...	785,342
1812	...	943,573	1820	...	1,207,459
1813	...	1,146,552	1821	...	1,293,432
1814	...	1,110,507	1822	...	1,037,007
1815	...	1,062,650	1823	...	759,366
1816	...	761,220	1824	...	576,496
1817	...	1,034,102	1825	..	573,609

The gold coinage of Popayan in Ecuador is as follows:—

1810	...	$886,056	1819	...	$566,722
1816	...	236,909	1823	...	495,848
1817	...	703,372	1824	...	840,563
1818	...	779,362	1825	...	742,978

In most of the rivers of the west coast of South America and in the Cordilleras, gold is found. In Peru, gold is found in Pataz, Huailas, Curimayo, near Caxamarca, and Curabaya, and the average yield is £60,000 yearly.

There are many gold mines in Chile, but silver and copper mining are preferred. In the Great Exhibition was a lump of gold ore, weighing 3 cwt. The average yearly produce fell to £160,000, but was formerly £400,000.

The amount of gold coined in the Valparaiso mint for the six months of this year, including July, is 7425 Spanish lbs., valued at £448,000.

§ 15. BRAZIL GOLD.

Gold is chiefly obtained from river washings in the Minas Geraes and Matto Grosso. In the former province, it is carried on by the Imperial Brazilian and St. John del Rey Mining Companies; being obtained partly from rock ore, but chiefly

from river washings. It is found scattered in grains in several primitive rocks. The chief time of working is when the gold streams overflow their banks. A man takes his place at the edge of the river, and begins to open a trench with a small hoe. In this trench the water is allowed to stand through the day, being poured off at night. The sediment, called "cascalho," is further washed, to obtain the ore. The gold mines are chiefly near St. John del Rey and Villa Rica. In Matto Grosso the chief gold workings are at Cuyaba and Jacobina, in the south-west. The yield has been estimated at 17,000 lbs. yearly, but in the last century the average yearly value was nearly £800,000.

The produce of the quintos or fifth of the gold from Minas Geraes, in the Brazils, gives the following yearly average:—

	Quintos. lbs. Portuguese.	Yearly Total of Produce. lbs. Portuguese.
1752 to 1757 ...	3,513 ...	17,565
1758 to 1765 ...	3,263 ...	16,315
1766 to 1771 ...	2,735 ...	13,175
1772 to 1777 ...	2,397 ...	11,985
1778 to 1783 ...	2,945 ...	14,725
1784 to 1789 ...	1,465 ...	7,325
1790 to 1795 ...	1,433 ...	7,165

From Paraguay, a lump of gold was obtained weighing 50 lbs.

§ 16. GOLD IN AFRICA.

In the north of Africa, gold is found in the sands near the town of Tripoli, and, indeed, throughout the Regency. Near the town, the sands of the sea shore contain small quantities of gold, which are sifted. The people gather it up in handfuls, put it into a wooden bowl, and wash it with several waters, till the gold is left at the bottom. Gold is found likewise near the Fezzan border.

In Morocco, in the neighbourhood of Tarudant, there is said to be gold mines in the hills, but they are not worked. In South Morocco, near a place called Shiebon, is a glen of alluvial soil, in which much gold is found, both in dust and lumps, which is gathered into ostrich or vulture quills. At Luca likewise gold is wrought.

The chief gold mines belonging to the Pasha of Egypt are in Kordofan, on the Fazangoro. In Abyssinia a little gold is found in the rivers.

Others in North Africa are in the mountains of Mandara; at Bourra on the Wassolo, in alluvial earth, and at Bambouk on the Wankaral. Of these, the yearly produce is reckoned at 5000 lbs.

The interior of Africa has long been known for producing large quantities of gold dust; but the geography is too little known to enable the sites of production to be identified.

In Foota Jalloo, on the west border, is a gold mine, in the country of Malee; and in Bambarra is likewise a gold mine.

The whole yearly yield of gold from Africa is perhaps £500,000.

Of all the African mines, the Bambouk mines are, however, supposed to be the richest. They are about thirty miles south of the Senegal river; and the inhabitants are chiefly occupied in gold washing during the eight months of dry weather. About two miles from Natakou is a small round-topped hill, about 300 feet high, the whole of which is an alluvial formation of sand and pulverized emery, with grains of iron ore and gold, in lumps, grains, and scales. This hill is worked throughout; and it is said the richest lumps are found deepest. There are 1200 pits or workings, some forty feet deep—but mere holes, unplanked. This basin includes at least 500 square miles. Forty miles north, at the foot of the Tabwara mountains, are the mines of Semayla, in a hill. This is of quartz slate; and the gold is got by pounding the rock in large mortars. In the river Semayla are alluvial deposits containing emery, impregnated with gold. The earth is washed by the women, in calabashes. The mine of Nambia is in another part of the Tabwara mountains, in a hillock, worked in pits. The whole gold district of Bambouk is supposed to extend over 10,000 square miles.

Close to the Ashantee country is that of the Bunkatoos, who have rich gold workings, in pits, at Bukanti and Kentosoe.

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Australian Continent; who, living, has seen the realization of his
prediction; and who, throughout a life of scientific usefulness, has
been ever ready to put forth his hand to uphold those
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